

**CLAIMS**

1. A method of determining an ability of a first device to use an optical trail to communicate across an optical transport network with one or more other devices, wherein the first device and the one or more other devices are external to the optical  
5 transport network, the method comprising acts of:
- (a) receiving at an input of a first transport network device of the optical transport network a first signal from the first device, the first signal indicating that at least a first port of the first device is available to be an endpoint for an optical trail across the optical transport network; and
- 10 (b) transmitting from the first transport network device to the first device a second signal identifying a second port of a second transport network device included in the optical transport network to which the first device can send signals corresponding to an optical trail.
- 15 2. The method of claim 1, further comprising:
- (c) transmitting the first signal from the first device; and
- (d) receiving the second signal at the first device.
- 20 3. The method of claim 1, further comprising an act of:
- (c) determining the second port to which the first device can send signals corresponding to an optical trail.
- 25 4. The method of claim 1, wherein the first signal is included in a Synchronous Optical Network frame.
5. The method of claim 4 wherein the request signal is included in overhead bytes of the Synchronous Optical Network frame.
- 30 6. The method of claim 1, wherein acts (a) and (b) are performed in accordance with the Point-to-Point Protocol.

7. The method of claim 1, wherein the first signal is received from the first port of the first device.
8. The method of claim 1, wherein the first signal identifies a user group to which the first port belongs.
9. The method of claim 1, wherein the first signal includes a digital signature corresponding to the first device.
10. 10. The method of claim 1, wherein the first signal comprises one or more port characteristic signals, each port characteristic signal indicating a characteristic of the first port.
11. The method of claim 9, wherein at least one of the characteristic signals indicates an ability of the first port to support concurrently a plurality of channels.
12. The method of claim 1, wherein the second signal comprises an acknowledgement signal acknowledging that the first port is available to be allocated an optical trail.
- 20 13. The method of claim 1, wherein the second signal further comprises one or more port characteristic signals, each port characteristic signal indicating a characteristic of the second port of the first transport network device.
14. The method of claim 13, wherein at least one of the port characteristic signals indicates an ability of the second port to process concurrently a plurality of channels associated with the first port.
- 25 15. The method of claim 1, wherein the second transport network device is the first transport network device.

16. The method of claim 1, wherein the second transport network device is not the  
first transport network device.
17. The method of claim 1, wherein the first device is physically interfaced to the  
5 first transport network device by at least a first link.
18. The method of claim 17, wherein the first link is an optical link.
19. The method of claim 1, wherein the first transport network device is capable of  
10 receiving and transmitting optical signals.
20. The method of claim 1, wherein the second transport network device capable of  
receiving and transmitting signals.
- 15 21. A system for determining an ability of a first device to use an optical trail to  
communicate across an optical transport network with one or more other devices,  
wherein the first device and the one or more other devices are external to the optical  
transport network, the system comprising:  
20      a first transport network device included as part of the optical transport network,  
the first transport network device comprising an input to receive a first signal from the  
first device, the first signal indicating that at least a first port of the first device is  
available to be an endpoint for an optical trail across the optical transport network, and  
an output to transmit to the first device a second signal identifying a second port of a  
second transport network device included in the optical transport network to which the  
25      first device can send signals corresponding to the optical trail.
22. The system of claim 21, wherein the system further comprises the first device,  
wherein the first device comprises an output to transmit the first signal and an input to  
receive the second signal.

23. The system of claim 21, wherein the first transport network device further comprises:

logic to determine the second port of the second transport network device.

5 24. The system of claim 21, wherein the input and the output are a same port of the first optical transport network device.

25. The system of claim 21, wherein the first signal is included in a Synchronous Optical Network frame.

10 26. The system of claim 25, wherein the first signal is included in overhead bytes of the Synchronous Optical Network frame.

15 27. The system of claim 21, wherein the input is operative to receive the first signal in accordance with the Point-to-Point Protocol, and the output is operative to transmit the second signal in accordance with the Point-to-Point Protocol.

28. The system of claim 21, wherein the first signal is received from the first port of the first device.

20 29. The system of claim 21, wherein the first signal identifies a user group to which the first port belongs.

25 30. The system of claim 21, wherein the first signal includes a digital signature corresponding to the first device.

31. The system of claim 21, wherein the first signal comprises one or more port characteristic signals, each port characteristic signal indicating a characteristic of the first port.

32. The system of claim 31, wherein at least one of the characteristic signals indicates an ability of the first port to support concurrently a plurality of channels.
33. The system of claim 21, wherein the second signal comprises an acknowledgement signal acknowledging that the first port is available to be allocated an optical trail.
34. The system of claim 21, wherein the second signal further comprises one or more port characteristic signals, each port characteristic signal indicating a characteristic of the second port.
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35. The system of claim 34, wherein at least one of the port characteristic signals indicates an ability of the second port to process concurrently a plurality of channels associated with the first port.
- 15
36. The system of claim 21, wherein the second transport network device is the first transport network device.
37. The system of claim 21, wherein the second transport network device is not the first transport network device.
- 20
38. The system of claim 21, wherein the first device is physically interfaced to the first transport network device by at least a first link.
39. The system of claim 38, wherein the first link is an optical link.
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40. The system of claim 21, wherein the first transport network device is capable of receiving and transmitting optical signals.
41. The system of claim 21, wherein the second transport network device is capable
- 30
- of receiving and transmitting optical signals.

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42. A system for determining an ability of a first device to use an optical trail to communicate across an optical transport network with one or more other devices, wherein the first device and the one or more other devices are external to the optical transport network, the system comprising:

5 means for receiving a first signal from the first device, the first signal indicating that at least a first port of the first device is available to be an endpoint for an optical trail across the optical transport network; and

10 means for transmitting from the first transport network device to the first device a second signal identifying a second port of a second transport network device included in the optical transport network to which the first device can send signals corresponding to an optical trail.

43. The system of claim 42, further comprising:

15 means for transmitting the first signal from the first device; and  
means for receiving the second signal at the first device.

44. The system of claim 42, further comprising:

means for determining the second port to which the first device can send signals corresponding to an optical trail.

20 45. The system of claim 42, wherein the first signal is included in a Synchronous Optical Network frame.

25 46. The system of claim 45, wherein the request signal is included in overhead bytes of the Synchronous Optical Network frame.

47. The system of claim 42, wherein the means for receiving is operative to receive the first signal in accordance with the Point-to-Point Protocol, and the means for transmitting is operative to transmit the second signal in accordance with the Point-to-Point Protocol.

48. The system of claim 42, wherein the first signal is received from the first port of the first device.
49. The system of claim 42, wherein the first signal identifies a user group to which 5 the first port belongs.
50. The system of claim 42, wherein the first signal includes a digital signature corresponding to the first device.
- 10 51. The system of claim 42, wherein the first signal comprises one or more port characteristic signals, each port characteristic signal indicating a characteristic of the first port.
- 15 52. The system of claim 51, wherein at least one of the characteristic signals indicates an ability of the first port to support concurrently a plurality of channels.
53. The system of claim 42, wherein the second signal comprises an acknowledgement signal acknowledging that the first port is available to be allocated an optical trail.
- 20 54. The system of claim 42, wherein the second signal further comprises one or more port characteristic signals, each port characteristic signal indicating a characteristic of the second port of the first transport network device.
- 25 55. The system of claim 54, wherein at least one of the port characteristic signals indicates an ability of the second port to process concurrently a plurality of channels associated with the first port.
56. The system of claim 42, wherein the second transport network device is the first transport network device.

57. The system of claim 42, wherein the second transport network device is not the first transport network device.
58. The system of claim 42, wherein the first device is physically interfaced to the first transport network device by at least a first link.
59. The system of claim 58, wherein the first link is an optical link.
- 10 60. The system of claim 42, wherein the first transport network device is capable of receiving and transmitting optical signals.
- 10 61. The system of claim 42, wherein the second transport network device capable of receiving and transmitting signals.
- 15 62. A computer program product, comprising:  
computer readable medium; and  
computer readable signals stored on the computer readable medium that define instructions that, as a result of being executed by a computer, instruct the computer to perform a process of determining an ability of a first device to use an optical trail to communicate across an optical transport network with one or more other devices, wherein the first device and the one or more other devices are external to the optical transport network, the process comprising acts of:  
20 (a) receiving at an input of a first transport network device of the optical transport network a first signal from the first device, the first signal indicating that at least a first port of the first device is available to be an endpoint for an optical trail across the optical transport network; and  
25 (b) transmitting from the first transport network device to the first device a second signal identifying a second port of a second transport network device included in the optical transport network to which the first device can send signals corresponding to an optical trail.
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63. A method of determining an ability of a first device to use an optical trail to communicate across an optical transport network with one or more other devices, wherein the first device and the one or more other devices are external to the optical transport network, the method comprising acts of:

- 5       (a) transmitting to a first transport network device of the optical transport network a first signal from the first device, the first signal indicating that at least a first port of the first device is available to be an endpoint for an optical trail across the optical transport network; and
- 10      (b) receiving from the first transport network device a second signal identifying a second port of a second transport network device included in the optical transport network to which the first device can send signals corresponding to an optical trail.

64. The method of claim 63, further comprising:

- 15      (c) receiving the first signal at the first transport network device; and
- (d) transmitting the second signal from the first transport network device.

65. The method of claim 64, further comprising an act of:

- 20      (e) determining the second port to which the first device can send signals corresponding to an optical trail.

66. The method of claim 63, wherein the first signal is included in a Synchronous Optical Network frame.

25      67. The method of claim 66, wherein the request signal is included in overhead bytes of the Synchronous Optical Network frame.

68. The method of claim 63, wherein acts (a) and (b) are performed in accordance with the Point-to-Point Protocol.

30      69. The method of claim 63, wherein the first signal is transmitted from the first port of the first device.

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70. The method of claim 63, wherein the first signal identifies a user group to which the first port belongs.
71. The method of claim 63, wherein the first signal includes a digital signature  
5 corresponding to the first device.
72. The method of claim 63, wherein the first signal comprises one or more port characteristic signals, each port characteristic signal indicating a characteristic of the first port.  
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73. The method of claim 72, wherein at least one of the characteristic signals indicates an ability of the first port to support concurrently a plurality of channels.  
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74. The method of claim 63, wherein the second signal comprises an acknowledgement signal acknowledging that the first port is available to be allocated an optical trail.  
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75. The method of claim 63, wherein the second signal further comprises one or more port characteristic signals, each port characteristic signal indicating a characteristic of the second port of the first transport network device.  
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76. The method of claim 75, wherein at least one of the port characteristic signals indicates an ability of the second port to process concurrently a plurality of channels associated with the first port.  
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77. The method of claim 63, wherein the second transport network device is the first transport network device.  
78. The method of claim 63, wherein the second transport network device is not the first transport network device.

79. The method of claim 63, wherein the first device is physically interfaced to the first transport network device by at least a first link.
80. The method of claim 79, wherein the first link is an optical link.
- 5 81. The method of claim 63, wherein the first transport network device is capable of receiving and transmitting optical signals.
- 10 82. The method of claim 63, wherein the second transport network device is capable of receiving and transmitting optical signals.
- 15 83. A system for determining an ability of a first device to use an optical trail to communicate across an optical transport network with one or more other devices, wherein the first device and the one or more other devices are external to the optical transport network, the system comprising:  
the first device comprising an output to transmit to a first transport network device of the optical transport network a first signal, the first signal indicating that at least a first port of the first device is available to be an endpoint for an optical trail across the optical transport network, and an input to receive from the first transport network  
20 device a second signal identifying a second port of a second transport network device included in the optical transport network to which the first device can send signals corresponding to an optical trail.
- 25 84. The system of claim 83, further comprising:  
the first transport network device comprising an input to receive the first signal and an output to transmit the second signal.
- 30 85. The system of claim 84, wherein the first transport network device further comprises logic to determine the second port to which the first device can send signals corresponding to an optical trail.

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86. The system of claim 83, wherein the input and the output are a same port of the first device.
87. The system of claim 83, wherein the first signal is included in a Synchronous Optical Network frame.
88. The system of claim 87, wherein the first signal is included in overhead bytes of the Synchronous Optical Network frame.
89. The system of claim 83, wherein the input is operative to receive the second signal in accordance with the Point-to-Point Protocol, and the output is operative to transmit the first signal in accordance with the Point-to-Point Protocol.
90. The system of claim 83, wherein the first signal is transmitted from the first port of the first device.
91. The system of claim 83, wherein the first signal identifies a user group to which the first port belongs.
92. The system of claim 83, wherein the first signal includes a digital signature corresponding to the first device.
93. The system of claim 83, wherein the first signal comprises one or more port characteristic signals, each port characteristic signal indicating a characteristic of the first port.
94. The system of claim 93, wherein at least one of the characteristic signals indicates an ability of the first port to support concurrently a plurality of channels.
95. The system of claim 83, wherein the second signal comprises an acknowledgement signal acknowledging that the first port is available to be allocated an optical trail.

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96. The system of claim 83, wherein the second signal further comprises one or more port characteristic signals, each port characteristic signal indicating a characteristic of the second port of the first transport network device.
- 5 97. The system of claim 96, wherein at least one of the port characteristic signals indicates an ability of the second port to process concurrently a plurality of channels associated with the first port.
- 10 98. The system of claim 83, wherein the second transport network device is the first transport network device.
99. The system of claim 83, wherein the second transport network device is not the first transport network device.
- 15 100. The system of claim 83, wherein the first device is physically interfaced to the first transport network device by at least a first link.
101. The system of claim 100, wherein the first link is an optical link.
- 20 102. The system of claim 83, wherein the first transport network device is capable of receiving and transmitting optical signals.
103. The system of claim 83, wherein the second transport network device is capable of receiving and transmitting optical signals.
- 25 104. A system for determining an ability of a first device to use an optical trail to communicate across an optical transport network with one or more other devices, wherein the first device and the one or more other devices are external to the optical transport network, the system comprising:
- 30 means for transmitting to a first transport network device of the optical transport network a first signal from the first device, the first signal indicating that at least a first

port of the first device is available to be an endpoint for an optical trail across the optical transport network; and

- means for receiving from the first transport network device a second signal  
identifying a second port of a second transport network device included in the optical  
5 transport network to which the first device can send signals corresponding to an optical  
trail.

105. The system of claim 104, further comprising:

- means for receiving the first signal at the first transport network device; and  
10 means for transmitting the second signal from the first transport network device.

106. The system of claim 105, further comprising an act of:

- (e) determining the second port to which the first device can send signals  
corresponding to an optical trail.

- 15 107. The system of claim 104, wherein the first signal is included in a Synchronous  
Optical Network frame.

- 20 108. The system of claim 107, wherein the request signal is included in overhead bytes  
of the Synchronous Optical Network frame.

109. The system of claim 104, wherein the means for receiving is operative to receive  
the first signal in accordance with the Point-to-Point Protocol, and the means for  
transmitting is operative to transmit the second signal in accordance with the Point-to-  
25 Point Protocol.

110. The system of claim 104, wherein the first signal is received from the first port of  
the first device.

- 30 111. The system of claim 104, wherein the first signal identifies a user group to which  
the first port belongs.

112. The system of claim 104, wherein the first signal includes a digital signature corresponding to the first device.
113. The system of claim 104, wherein the first signal comprises one or more port  
5 characteristic signals, each port characteristic signal indicating a characteristic of the first port.
114. The system of claim 113, wherein at least one of the characteristic signals indicates an ability of the first port to support concurrently a plurality of channels.  
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115. The system of claim 104, wherein the second signal comprises an acknowledgement signal acknowledging that the first port is available to be allocated an optical trail.
116. The system of claim 104, wherein the second signal further comprises one or  
15 more port characteristic signals, each port characteristic signal indicating a characteristic of the second port of the first transport network device.
117. The system of claim 116, wherein at least one of the port characteristic signals indicates an ability of the second port to process concurrently a plurality of channels  
20 associated with the first port.
118. The system of claim 104, wherein the second transport network device is the first transport network device.
- 25 119. The system of claim 104, wherein the second transport network device is not the first transport network device.
120. The system of claim 104, wherein the first device is physically interfaced to the first transport network device by at least a first link.  
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121. The system of claim 120, wherein the first link is an optical link.

122. The system of claim 104, wherein the first transport network device is capable of receiving and transmitting optical signals.

123. The system of claim 104, wherein the second transport network device capable of  
5 receiving and transmitting signals.

124. A computer program product, comprising:  
computer readable medium; and  
computer readable signals stored on the computer readable medium that define  
10 instructions that, as a result of being executed by a computer, instruct the computer to perform a process of determining an ability of a first device to use an optical trail to communicate across an optical transport network with one or more other devices, wherein the first device and the one or more other devices are external to the optical transport network, the method comprising acts of:

15 (a) transmitting to a first transport network device of the optical transport network a first signal from the first device, the first signal indicating that at least a first port of the first device is available to be an endpoint for an optical trail across the optical transport network; and

20 (b) receiving from the first transport network device a second signal identifying a second port of a second transport network device included in the optical transport network to which the first device can send signals corresponding to an optical trail.

125. A method of determining an ability of a first device to use an optical trail to communicate across an optical transport network with one or more other devices, wherein the first device and the one or more other devices are external to the optical transport network, the method comprising acts of:

(a) transmitting from the first device a first signal indicating that at least a first port of the first device is available to be an endpoint for an optical trail across the optical transport network;

30 (b) receiving the first signal at a first transport network device of the optical transport network;

(c) transmitting from the first transport network device a second signal

identifying a second port of a second transport network device included in the optical transport network to which the first device can send signals corresponding to an optical trail; and

(d) receiving the second signal at the first device.

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126. A system for determining an ability of a first device to use an optical trail to communicate across an optical transport network with one or more other devices, wherein the first device and the one or more other devices are external to the optical transport network, the system comprising:

10 the first device comprising a first output to transmit a first signal indicating that at least a first port of the first device is available to be an endpoint for an optical trail across the optical transport network, and comprising a first input to receive a second signal identifying a second port of a second transport network device included in the optical transport network to which the first device can send signals corresponding to an optical trail; and

15 a first transport network device comprising a second input to receive the first signal, and comprising a second output to transmit the second signal.

127. A system for determining an ability of a first device to use an optical trail to communicate across an optical transport network with one or more other devices, wherein the first device and the one or more other devices are external to the optical transport network, the system comprising:

20 means for transmitting from the first device a first signal indicating that at least a first port of the first device is available to be an endpoint for an optical trail across the optical transport network;

25 means for receiving the first signal at a first transport network device of the optical transport network;

means for transmitting from the first transport network device a second signal identifying a second port of a second transport network device included in the optical

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transport network to which the first device can send signals corresponding to an optical trail; and

means for receiving the second signal at the first device.

- 5    128. A computer program product, comprising:  
            computer readable medium; and  
            computer readable signals stored on the computer readable medium that define  
instructions that, as a result of being executed by a computer, instruct the computer to  
perform a process of determining an ability of a first device to use an optical trail to  
10    communicate across an optical transport network with one or more other devices,  
wherein the first device and the one or more other devices are external to the optical  
transport network, the method comprising acts of:  
            (a) transmitting from the first device a first signal indicating that at least a first  
port of the first device is available to be an endpoint for an optical trail across the optical  
15    transport network;  
            (b) receiving the first signal at a first transport network device of the optical  
transport network;  
            (c) transmitting from the first transport network device a second signal  
identifying a second port of a second transport network device included in the optical  
20    transport network to which the first device can send signals corresponding to an optical  
trail; and  
            (d) receiving the second signal at the first device.